INSTITUTE *of* STATISTICS
Oxford

Bulletin Vol. 11 *December, 1949* *No. 12*

QUARTERLY ESTIMATES OF THE NATIONAL INCOME

(All Tables are in annual rates, £ millions. Residuals are given in parentheses. There have been some revisions of our previous estimates, particularly for the second quarter of 1949. Notes are given at the end of the paper.)

TABLE I

National Income. At current factor cost, seasonally corrected.

	1948				1949		
	I	II	III	IV	I	II	III
Agriculture	480	500	560	590	560	620	680
Manufacturing	5140	5190	5310	5530	5600	5850	5870
Services	3090	3160	3210	3220	3240	3270	3300
Total Business	8710	8850	9080	9340	9400	9740	9850
Government	1040	1020	1020	1030	1040	1040	1040
Other	470	480	480	480	490	490	500
Gross National Income ...	10220	10350	10580	10850	10930	11270	11390
Less Depreciation ...	790	810	840	860	880	900	920
Net National Income ...	9430	9540	9740	9990	10050	10370	10470

TABLE II

National Income. At end–1948 *factor cost, seasonally corrected*

	1948				1949		
	I	II	III	IV	I	II	III
Agriculture	540	550	610	660	620	650	690
Manufacturing	5330	5370	5420	5530	5600	5820	5770
Services	3200	3210	3240	3230	3230	3240	3260
Total Business	9070	9130	9270	9420	9450	9710	9720
Government	1060	1040	1030	1030	1040	1040	1030
Other	470	480	480	480	490	490	500
Gross National Income ...	10600	10650	10780	10930	10980	11240	11250
Less Depreciation ...	790	810	840	860	880	900	920
Net National Income ...	9810	9840	9940	10070	10100	10340	10330

On the production side, the fast industrial expansion in the second quarter appears not to have been maintained. This is probably due in part to the inadequate allowance for the current holidays implied in the calculation of seasonal correction factors from 1946–1948 data, and also in part to the remarkable production indices for the second quarter. Too much should not therefore be read into the apparent halting of the rise in real income and the slower expansion of national income at current prices. Looking over a longer period it seems that real income has been rising at the same rate (£90m. per quarter) since the end of 1948 as it was during 1948.

TABLE III

Distributive Shares. At current factor cost, seasonally corrected

	1948				1949		
	I	II	III	IV	I	II	III
Wages	3830	3920	4030	4120	4170	4220	4280
Salaries	1810	1835	1860	1885	1910	1935	1960
Forces' Pay	280	245	225	230	225	220	215
Rent	425	430	430	435	435	440	440
Profits and Interest ...	(3085)	(3110)	(3195)	(3320)	(3310)	(3555)	(3575)
Net National Income ...	9430	9540	9740	9990	10050	10370	10470

The rate of increase in the wage bill appears from the latest earnings figures to be definitely slowing up, and as we suspected the 1949 estimates previously made were slightly too high. The share of wages in the national income seems to have continued to rise in 1948 and declined slightly in 1949. Very little attention should be paid to quarterly movements in the profits residual in Table III, but the increase over the whole period appears to imply a further increase in the share of this factor in the national income.[1]

The raw balance of payments data indicate a continued deficit in the third quarter, *apart from any delay in payments for exports due to the expectation of devaluation.* However, the export surplus figure shown in Table IV has a certain significance, since it is likely that any deficit due to such a delay will be automatically compensated in the fourth quarter. A comparison with the corresponding item in Table V indicates that this deficit was probably mainly seasonal, and that the approximate overall balance continued when an allowance was made for the seasonal factor. The sustained expansion in invisible exports appears to have played a large part in maintaining a near balance overall, though invisible imports have also risen sharply.

The expansion in consumption, particularly of food, which was indicated for the second quarter in the last set of estimates and confirmed by the latest official quarterly figures, appears to have continued in the third quarter, though the rise in the total is due only to higher prices. After the immediate boom following the end of rationing, real clothing expenditure appears to have dropped back to a level below any quarter last year, balancing an increase in the volume of food consumption and tobacco purchases.

An analysis of the increase in the volume of food consumption which has taken place this year has been attempted, and a comparison between the first three quarters of 1949 with the corresponding period last year indicates an increased consumption of milk, eggs, cheese, fats, sugar and chocolate which was more than sufficient to counteract decreased consumption of meat and fish.

Table VIII is a new one. It was devised primarily to show movements in personal savings (here defined as after making provision for taxes on income but before deducting death duties and the special contribution) in relation to personal income, because of the importance of this ratio for examining inflationary pressure. After falling since the end of the war,

---

[1] The marginal share of profits in income seems to be about .5.

TABLE IV

Foreign Trade. At current prices, NOT *seasonally corrected*

	1948				1949		
	I	II	III	IV	I	II	III
Visible Imports	1705	1890	1735	1740	1830	1985	1930
Invisible Imports	565	500	465	390	530	545	600
Total Payments	2270	2390	2200	2130	2360	2530	2530
Visible Exports	1390	1530	1590	1690	1850	1775	1740
Invisible Exports	540	580	610	600	600	625	660
Total Receipts	1930	2110	2200	2290	2450	2400	2400
Net Export Surplus	—340	—280	—	+160	+90	—130	—130

TABLE V

Foreign Trade. At current prices, seasonally corrected

	1948				1949		
	I	II	III	IV	I	II	III
Visible Imports	1780	1785	1685	1825	1910	1875	1870
Invisible Imports	575	510	425	405	540	555	565
Total Payments	2355	2295	2110	2230	2450	2430	2435
Visible Exports	1425	1530	1590	1670	1900	1770	1730
Invisible Exports	540	580	605	610	605	625	650
Total Receipts	1965	2110	2195	2280	2505	2395	2380
Net Export Surplus	—390	—185	+85	+50	+55	—35	—55

TABLE VI

Consumption. At current prices, seasonally corrected

	1948				1949		
	I	II	III	IV	I	II	III
Food	2135	2180	2180	2220	2155	2325	2470
Drink	740	780	765	755	675	725	735
Tobacco	740	805	770	770	725	770	815
Rent and rates	595	595	595	605	610	610	615
Fuel and light	335	355	350	360	360	355	340
Household goods	530	510	515	510	550	565	555
Clothing	815	810	895	880	950	960	880
Other	2010	1970	1945	1970	1985	2000	2005
Total	7900	8005	8015	8070	8010	8310	8415

TABLE VII

*Consumption. At end-*1948 *prices, seasonally corrected*

	1948				1949		
	I	II	III	IV	I	II	III
Food	2155	2140	2190	2220	2150	2230	2295
Drink	800	780	765	755	675	775	780
Tobacco	775	805	770	770	725	770	815
Rent and rates	595	600	600	605	610	610	610
Fuel and light	345	360	355	360	355	360	340
Household goods	530	515	520	510	550	565	555
Clothing	910	875	930	890	940	940	855
Other	2015	1980	1945	1970	1985	1975	1980
Total	8125	8055	8075	8080	7990	8225	8230

TABLE VIII

Aggregate Personal Income. At current prices, seasonally corrected

	1948				1949		
	I	II	III	IV	I	II	III
Consumption	7900	8005	8015	8070	8010	8310	8415
Direct Taxes	1315	1270	1415	1470	1480	1515	1580
Savings	(145)	(210)	(245)	(305)	(395)	(225)	(220)
Aggregate Personal Income	9360	9485	9675	9845	9885	10050	10215

personal savings apparently turned upwards again during 1948. An increase between the first quarter of 1948 and the first quarter of 1949 seems definitely established, since the apparent increase in consumption is unaffected by seasonal correction factors, and the combined error in the other two items in Table VIII could hardly be £200 millions. It can be ascribed to a slowing of industrial expansion, associated with the end of demobilisation, while exports continue to rise and Government current spending turned upward. So there was little increase in consumption, though personal incomes continued to rise. The levelling off of exports, however, in the middle of 1949 permitted increased consumption at a greater rate than personal disposable income was rising, and personal saving fell once more, reducing inflationary pressure (defined as the gap between 'voluntary' and 'actual' savings). During the third quarter, as in early 1948, personal savings became barely adequate to cover death duties, implying substantial dis-saving by sections of the public to balance institutional forms of saving.

Table IX is also a new table. It attempts to show the seasonal pattern of the economy, with the building up of stocks (including growing farm products) during the first half of the year, when consumption is low but production high, and the destocking in summer and autumn when production is particularly affected by holidays but buying is high, particularly of food.[1] It can be inferred that total stocks in the economy are at their seasonal minimum in the New Year.

TABLE IX

National Expenditure. At current prices, NOT *seasonally corrected*

	1948				1949		
	I	II	III	IV	I	II	III
Consumption	7515	7925	8185	8390	7605	8230	8650
Govt. current spending	1880	1875	1920	1970	2020	2065	2135
Net Investment	(1920)	(1745)	(1045)	(1315)	(2005)	(1865)	(1295)
Exports	1930	2110	2200	2290	2450	2400	2400
Less Imports	—2270	—2390	—2200	—2130	—2360	—2530	—2530
Net National Product	10975	11265	11150	11835	11720	12030	11950
Less net Indirect Taxes...	—1495	—1645	—1650	—1725	—1520	—1670	—1750
Net National Income ...	9480	9620	9500	10110	10200	10360	10200

---

[1] The primitive pattern of barer living in the winter and spring still partly survives, despite all human endeavours to level out food consumption by innovations in production and storage.

Table X continues the series originally given, though with an important technical change described in the notes. When seasonal correction is made, the use of the resources in the second and third quarters remained very similar. Any changes in the proportion devoted to each purpose lies within the margin of error. Even the implied fall in investment can be accounted for by the probably inadequate increase in the estimate of the aggregate noted above.[1]

TABLE X

National Expenditure. At current prices, seasonally corrected

	1948				1949		
	I	II	III	IV	I	II	III
Consumption	7900	8005	8015	8070	8010	8310	8415
Govt. current spending	1880	1875	1920	1970	2020	2065	2135
Net Investment	(1625)	(1550)	(1380)	(1545)	(1530)	(1690)	(1715)
Exports	1965	2110	2195	2280	2505	2395	2380
Less Imports	—2355	—2295	—2110	—2230	—2450	—2430	—2435
Net National Product	11015	11245	11400	11635	11615	12030	12210
Less net Indirect Taxes	—1585	—1705	—1660	—1645	—1565	—1660	—1740
Net National Income	9430	9540	9740	9990	10050	10370	10470

An attempt is made in Table XI to correct expenditure estimates for price changes. When this is done it appears that at end-1948 prices, *i.e.* but for the improvement in the terms of trade, our balance of payments in mid-year would look rather worse than it in fact was.[2] This table also brings out in real terms the main point already mentioned—the continued displacement of exports by home consumption throughout the summer, financed by some dis-saving.

TABLE XI

National Expenditure. At end-1948 prices, seasonally corrected

	1948				1949		
	I	II	III	IV	I	II	III
Consumption	8125	8055	8075	8080	7990	8225	8230
Govt. current spending	1960	1920	1950	1980	2015	2055	2125
Net Investment	(1860)	(1720)	(1475)	(1590)	(1590)	(1775)	(1825)
Exports	2040	2170	2225	2295	2525	2395	2380
Less Imports	—2505	—2350	—2145	—2240	—2445	—2445	—2510
Net National Product	11480	11515	11580	11705	11675	12005	12050
Less net Indirect Taxes	—1670	—1675	—1640	—1635	—1575	—1665	—1720
Net National Income	9810	9840	9940	10070	10100	10340	10330

DUDLEY SEERS,

In association with P. D. HENDERSON and D. G. HOLLAND.

---

[1] Any Government stock-building will implicitly appear as current expenditure in our estimates.

[2] Even seasonally-corrected, it would have been £130m.—unless of course the continuance of high import prices would have led to greater import economies.

NOTES

The general methods are the same as those described in the October BULLETIN. *The cautions given there should be carefully noted before interpretation is attempted.* The major changes are that we now show some figures before seasonal correction, that we have tried to give more figures corrected for price changes, and that we are using a different method of estimating quarterly tax liabilities. Figures are given at end-1948 prices to facilitate comparison with the Economic Survey.[1] We take ' end-1948 ' to be as near December 31st as can be estimated.

Table II. Agricultural values are high because of the seasonally high price at the very end of the year.

Table III. We cannot give seasonally uncorrected figures, because of ignorance of the seasonal pattern of the wage-bill.[2] The latest earnings data permit revision of the wage-bill for the final three quarters. As we suspected, the ' residual ' earnings index is now much smaller (100.4 per quarter).

Tables IV, V. The procedure differs from that in the October BULLETIN, in that there the grouping was that of the National Income White Paper, but the treatment here follows the grouping of the Balance of Payments White Papers. The estimates for 1948, as well as those for the first half of 1949, have been revised in the light of the recently published White Paper (*Cmd.* 7793). The most important modification relates to visible exports. It is clear from the new White Paper that, owing to the fall of exports during the first half of this year, the discrepancy between the value of payments actually received and the value of goods shipped has become very small. The adjustment of 6 per cent, which was made in the previous calculations, in order to make the Board of Trade figures comparable with those given in the White Paper, has therefore been reduced—deductions for the first three quarters of 1949 being (successively) 3 per cent, 1 per cent, and zero. Once again, no attempt has been made to take account of any postponement of payments which may have resulted from expectations that sterling would be devalued, since it was not possible to make any assessment of this factor. In so far as it has been important, the payments for exports in the third quarter have been over-estimated.

Table VIII. Changes compared to the previous definitions are that savings, direct taxes and the aggregate are now net of undistributed profits, and savings and the aggregate are shown excluding capital transfers.

Aggregate Private Income was reached by adding to the National Income quarterly estimates of (*a*) National Debt Interest, assumed to follow a downward trend of £2 million per quarter; and (*b*) Transfer payments, which were estimated in detail and appear to have turned upward in mid-1948, the increase in social security benefits probably outweighing the reduction in the pay of those on release leave. Government property income was deducted, being assumed (for lack of information on this very mixed bag) to remain constant. Then gross undistributed profits were estimated. These could not be directly ascertained, but it was assumed that of the increases in profits and interest shown in Table III, the greater part could be attributed to undistributed profits, in view of dividend limitation. Corrections were made for professional earnings (extrapolating a past upward trend of £4 millions per quarter), farming income (assumed to absorb all changes in the agricultural product, except for the wage increase) and profits of sole traders. When the last was plotted against consumption expenditure, a remarkably high correlation was obtained, and the regression co-efficient of .143 was used to estimate increases in sole traders' profits due to increased consumer expenditure. The changes in undistributed profits thus obtained were applied to the 1948 estimate to give (seasonally corrected) quarterly estimates, which were subtracted from aggregate private income to obtain aggregate personal income.

---

[1] In view of the rather odd price pattern in the winter, average annual prices are probably in general to be preferred as a basis for fixed price estimates.

[2] The quarterly series in the White Paper is in effect seasonally corrected (see p. 46).

In estimating direct tax liabilities, employees' contributions to national insurance were first estimated directly. Central Government direct taxes had been estimated in the previous set of estimates by seasonally correcting direct tax receipts, but this was not very satisfactory because of the shifting seasonal pattern since the war. It seemed preferable to try to relate taxation more closely to income. Comparison of 1947–8 and 1948–9 receipts revealed that after correction for changes in rates, about one-third of the increase in private income was absorbed in higher tax revenue. This is not an unreasonable figure, since much of the increased income is taxed at about .36 (9/– in the £, less earned income relief), some of the remainder being subject to surtax and profits tax, while increased wages are on the whole subject to a lower marginal incidence. This proportion of one-third was then applied to the estimated increase in marginal income. The tax increases so obtained, together with the information in the financial statement on the effect of tax rate changes, were used to distribute (seasonally corrected) tax liabilities in 1948 over the quarters.[1] Taxation on undistributed profits can be taken to be .55, and this proportion was applied to the undistributed profits figures obtained above to provide by deduction taxation on personal income. The increased depreciation allowance this year on new plant is ignored when estimating both depreciation and tax liabilities. Since only taxes on income are deducted, the residual for savings is implicitly gross of death duties (currently running at about £175 millions) and the special contribution (£79 millions in 1948–9, and about £25 millions this year). Thus seasonally corrected net personal saving is implied as low or negative, except early this year.

Table IX. Estimates *before* seasonal correction can only be made for the manufacturing sector of national output. We could estimate the value of agricultural deliveries each quarter, but the concept we are aiming at here is of *work done*. It seems more realistic to treat increases in agricultural ' work in progress' implicitly as short-period investment than to imply that it is valueless and to consider wages, etc., paid on field labour (other than at harvest) as dis-saving. It would seem that seasonally corrected deliveries are actually better than uncorrected deliveries as indicators of work done. The seasonal patterns in the sectors of service industries and the Government are also inestimable, but they would be small. So the seasonal change in the national income is taken to be fairly adequately represented by the seasonal change in industrial output. For the treatment of indirect taxes, see note to Table X.

---

[1] In seasonally corrected estimates our interest is in *liabilities*, rather than *payments*.

The uncorrected estimates for consumption are taken directly from the *Digest of Statistics*, with an estimate for the third quarter of 1949, and the raw figures for exports are from Table IV. Our estimates of Government current spending, because of their method of construction, are automatically corrected for seasonal fluctuations and for lack of knowledge of seasonal pattern we cannot prepare uncorrected estimates. The fluctuations in supply issues appeared to be mainly due to changes in departmental balances, Government debts, etc., and thus are not much good for estimating the quarter's current expenditure. Balance of payments data are from Table IV.

The residual estimate of Investment throws some light on the stock movements that are implied by the other estimates.

Table X. A change similar to that in direct taxes has been made in the treatment of indirect taxes. Previously the indirect tax figures in the Exchequer returns were adjusted by seasonal correction factors, but this was on the whole not so successful as the correction of consumption, as can be seen from the last set of estimates, presumably because of a varying time lag before indirect taxes are passed on to the Exchequer. On reflection it seemed better to try to estimate the indirect taxes attributable to the consumption estimates. A comparison of the market price and national cost consumption estimates[1] implied the indirect taxes (net of subsidies) attributable to each commodity group, which enabled us to estimate the average indirect tax margins as a percentage of market price. These margins turned out to be as follows for 1948.

Drink	55	Motoring	22
Tobacco	80	Travel	5
Rent and Rates	30	Communications ...	9
Fuel and Light	1	Entertainment	34
Household durables ...	20	Other services	7
Other household goods ...	10	Other goods	25
Clothing	8	Unallocated	3[2]
Reading matter	0		

Such percentages, as one would expect, have been fairly stable since the war, apart from fluctuations obviously attributable to tax and subsidy changes. These margins were calculated for the groups into which the non-food estimates are divided, and approximate changes introduced to take care of the alterations introduced by the last two Budgets. They were then applied to the consumption estimates, to provide estimates of indirect taxes attributable to the consumption outlay in each quarter. Net indirect taxes on Government spending, investment and exports were similarly treated. For food expenditure, gross indirect taxes for 1948 were found by adding subsidies to net indirect taxes found as above, and the implied gross margin was applied to food consumption estimates, while food subsidy changes were estimated from ministerial statements. By these means the estimates shown for total net indirect taxes were obtained, changes in both the amount and nature of expenditure being taken into acount. Similar methods were used to provide the estimates in Tables IX and XI.

---

[1] Tables 20 and 22 in *Cmd*. 7649.

[2] As a percentage of total consumption.

Balance of payments data were taken from Table V, and the other estimates in this table were obtained by methods already described. Since random fluctuations in payments of indirect taxes have been eliminated, it is hoped that the residual estimate of investment is a more realistic one.

Table XI The aggregate here comes from Table II, and Consumption estimates from Table VII. Government current spending was split into its components[1], each of which was separately deflated—personal services by the wage-rate index, purchases from enterprises by the gross manufacturing price index we used in evaluating industrial output, and expenditure abroad by import prices. Visible exports and imports (in Table V) were deflated by their respective price indices, invisibles being left unchanged for lack of adequate indices. The residual is in principle implicitly corrected for price changes, since the national product estimates allow for changes in factor cost and indirect taxes, and all other items are corrected for price changes so far as this can be done. Needless to say, however, very little should be read into the implied changes in real investment. Even when this calculation is attempted with annual income estimates, it produces apparently inconsistent results,[2] and here the possiblities of error are much greater.

---

[1] *Cmd.* 7649, Table 2, Item 2.

[2] See the July–August BULLETIN, p. 185.

A 'HUMAN NEEDS' DIET IN NOVEMBER 1949

In November 1949 we again computed the cost of a 'human needs' diet for a family of five persons,[1] comparable to the diet outlined by Mr. S. Rowntree in 1936. Surveys were undertaken in Oxford, Reading, and in several working class districts of London. Shops of the appropriate types were visited, and prices collected and compared. With the better supply of a number of foodstuffs competition has become keener, and slight variations in the prices of identical commodities were encountered frequently. In all cases where such differences occurred within the same district we employed for our schedule the lowest prices, provided the following conditions were fulfilled: first, the price had to be the normal one for the particular shop and not the result of a very temporary reduction, and it also had to be displayed in the shop window, unless the shop was generally known to charge exceptionally low prices; secondly, the food in question had to be either unrationed or rationed on 'points', so that it could be purchased by any housewife in any shop; thirdly, the shop had to be clean and of a reasonably attractive appearance. On comparing our price lists thus compiled for each of the several localities it was found that over the whole range of foods included in the 'human needs' diet, the differences in prices approximately cancelled out, and the cost shown in Table I can therefore be taken to represent that figure at which any housewife could obtain the diet in the districts visited by us, while some housewives might have managed to purchase it at a slightly lower cost.

The total weekly cost of a 'human needs' diet, as defined, was found to be 48s. 11d., *i.e.*, it was 3d. higher than in May 1949. This small difference in cost, however, represents the outcome of a considerable number of changes. At the end of May old root vegetables other than potatoes and onions were practically unobtainable and new vegetables were dear. Hence in spite of the fact that, for May, our dietary only included 12½ lbs. of the cheapest fresh vegetables—greens and onions—as against 14 lbs. of carrots, swedes, cabbage, and onions, included in our dietary for November, the total cost of fresh vegetables in May was 1s. 3¾d. higher than in November. Since carrots are an important source of vitamin A, we allowed in May in supplementation of the fresh vegetables a tin of carrots, costing 11½d. Thus the availability of relatively cheap fresh vegetables in November reduced the cost of the diet by 2s. 3¼d. A further reduction was achieved in November by replacing 3 lbs. of mackerel by their approximate nutritional equivalent in herrings, *viz.*, 2 lb. 8 oz. In May, herrings had been very scarce and it had been impossible for most housewives to buy any during the period covered by our survey. The smaller quantity required of herrings, which are cheaper and more nutritious than mackerel, accounts for a reduction in the cost of fish in November, by 10¾d. Against these savings stands as the largest item the rise in the cost of bread and flour, owing to the rise in price, and amounting to 1s. 1d. The cost of meat included in our diet rose, indeed, by

---

[1] Husband, wife, 2 children 7–12 and 1 child 5 years old.

TABLE I

Weekly 'Human Needs' Diet for a Family of 5 Persons

		Quantity	Price per Unit[1] s.	d.	Changes since May 1949 Quantity	*Outlay* *s.*	*d.*
(*a*)	Rationed Foods, *excluding fresh milk* :						
1	Meat	4 lb 4 oz.	1	7	+ 8 oz.	+ *1*	*3*
2	Bacon	15 oz.	2	0	+ 5 oz.	+	*7½*
3	Margarine	2 lb 3 oz.		10	+ 5 oz.	+	*3¼*
4	Cooking Fat	10 oz.	1	0	...		...
5	Sugar	2 lb 8 oz.		5	— 10 oz.	—	*3¼*
6	Syrup	1 lb		9½[2]	...		...
7	Tea	8 oz.	3	6	...		...
8	Cheese	10 oz.	1	2	...		...
9	Eggs	5 eggs		3½	— 5 eggs	—	*7½*
10	Condensed milk, skimmed	2 tins		9	...	+	*2*
11	Rice	1 lb 8 oz.		9	+1 lb 8 oz.	+ *1*	*1½*
12	Dried Fruit[3]	1 lb	1	0	...	+	*2*
	Outlay on Group (*a*)		*20*	*4¾*		+ *2*	*8½*
(*b*)	Fresh Milk :						
13*a*	Ordinary	15 pints		5	+ 1 pint	+	*5*
13*b*	School	5 pints	free		...		...
	Outlay on Group (*b*)		*6*	*3*		+	*5*
(*c*)	Main Carbohydrate Foods :						
14	Bread	21 lb 14 oz.		5	...	+ *1*	*0½*
15	Flour	2 lb		4	...	+	*0½*
16	Potatoes	21 lb		1¾	...		...
	Outlay on Group (*c*)		*9*	*5½*		+ *1*	*1*
(*d*)	Fresh Vegetables :						
17*a*	Carrots	3 lb 8 oz.		1¾	+3 lb 8 oz.	+	*6¼*
17*b*	Swedes	2 lb 8 oz.		3	+2 lb 8 oz.	+	*7½*
17*c*	Cabbage	7 lb		4	—3 lb 8 oz.	— *2*	*0½*
17*d*	Onions	1 lb		5	—1 lb	—	*5*
	Outlay on Group (*d*)		*3*	*10¾*		—*1*	*3¾*
(*e*)	Other Foods :						
18*a*	Dried Peas	8 oz.		10½	...		...
18*b*	Haricot Beans	8 oz.		11	...		...
19	Rolled Oats	2 lb 8 oz.		7	...		...
20	Pearl Barley	...		...	— 6 oz.	—	*2¾*
21*a*	Macaroni	4 oz.		10	— 4 oz.	—	*2*
21*b*	Semolina	...		...	— 11 oz.	—	*4¾*
22	Jam	6 oz.	1	2	...		...
23	Cocoa	4 oz.	1	3½	...		...
24	Condiments	...	1	0	...		...
25*a*	Herrings	2 lb 8 oz.		6½	+2 lb 8 oz.	+ *1*	*4¼*
25*b*	Kippers	2 lb 7 oz.		11	...		...
25*c*	Mackerel	...		...	—3 lb	— *2*	*3*
26	Sausages	7 oz.	1	6	...		...
27	Tinned Carrots	...		...	—1 tin	—	*11½*
	Outlay on Group (*e*)		*8*	*11*		— *2*	*7¾*
	Total Outlay		**48**	**11**		+	**3**

[1] The price unit is : eggs, one egg ; condensed milk, tin ; fresh milk, pint ; bread, 1¾ lb loaf ; cocoa, ½ lb tin ; condiments, total outlay ; all other foods, lb.

[2] Bought in 2 lb tins.

[3] Prunes in November 1949, figs in Mav 1949.

more than that, but this increase in cost could be offset at least in part by an increase in quantity. Since in some districts most of the cheaper cuts of meat seemed to be of a very poor quality, in particular on Fridays and Saturdays, when most poor housewives are buying the bulk of their meat ration, we allowed for an increase in the average price of meat, from 1s. 5½d., in May to 1s. 7d. a lb. in November, as it often appeared more economical to buy the weekly meat ration for a medium sized family in the form of a substantial cut at about 1s. 7d. a lb. than to obtain it partly in the form of cheaper stewing meat. The combined ration of margarine and butter amounted in May to 7 oz. per head per week, but in our basic diet for May we only included 6 oz. per head, in view of the fact that with less than this allowance the children's shares in the diet would have been sufficient to cover their calorific requirements, allowing a total consumption of fat of 11 oz. per week by the husband and of 10 oz. by the wife, instead of their total ration of 7 oz. per head[1]. From mid-July, the total fat ration was increased to 10 oz. per head per week, 8 oz. of which could be purchased in the form of margarine. However, for the reasons set out, we only assumed in our ' human needs ' dietary in November a consumption of margarine per head per week of 7 oz., *i.e.*, of 1 oz. per head more than in May, just enough to compensate for the loss of calories due to the reduction in the sugar ration, by 2 oz. per head per week. As will be seen, the differences in cost cancel out.

The seasonal decline in the supply of eggs is reflected in the smaller number of eggs in the dietary for November, but since the price of eggs had gone up the savings effected by omitting 5 eggs only amounted to 7½d., which is as much as was required for the purchase of an additional 5 oz. of bacon, the weekly bacon ration per head having been raised from 2 oz. to 3 oz. The changes in the supply of these two foods provided slightly more calories but less protein from these sources in November, as compared with May. This deficiency in protein is, however, more than compensated by the inclusion in the dietary of another pint of fresh milk, giving 15 pints of domestically consumed fresh milk per week for November as against 14 pints of it for May.

Rice was freely available in November, and since in general ' points ' appeared to be more plentiful than attractive foods thus rationed, we assumed that a housewife would be prepared to give up 12 'points' out of 30 'points'—the weekly allowance for 5 people—for 1½ lb. of rice and, in compensation, curtail her purchases of unrationed cereals. Figs at 10d. a lb. were unrationed and could be brought feely in May, but in November they were scarcely obtainable. Hence we substituted for them 1 lb. of prunes, costing 2d. more and requiring 4 ' points '. A further 4 ' points ' had to be surrendered for 2 tins of skimmed condensed milk, while 7 ' points ' were needed for the purchase of 1 lb. of syrup, provided it was bought in 2 lb. tins; for tins or jars containing only 1 lb., 8 ' points ' had to be given up. The total outlay of ' points ' on the diet would have been 27 per week.

[1] *Cf.* BULLETIN Vol. 11, No. 6, *A 'Human Needs' Diet.*

TABLE II

Weekly Low Cost Diet for 5 Persons

	Quantity	Outlay	'Points'
'Human Needs' Diet		**48s. 11¼d.**	**27**
Excluding :		s. d.	
Syrup	1 lb	9½	7
Rice	4 oz.	2¼	2
Bread	1 lb 14 oz.	6	—
Sausages	7 oz.	8	—
		2 1¾	9
Including :		s d.	
Margarine	5 oz.	3¼	—
Baked Beans	2 tins[1]	1 8	12
Boiled Sweets	10 oz.	1 1¾	—
Plain Chocolate	10 oz.	2 1	—
		5 2	12
Low Cost Diet		**51 11¼**	**30**

[1] 1 tin : 16 oz.

In Table II we show a slightly modified dietary, allowing not only for the purchase of the full ration of margarine and the family's sweets ration, but also for the expenditure of all the 'points'. This diet would have supplied about the same nutritional intake as the 'human needs' diet and would have cost just over 3s. more, requiring a weekly outlay of 51s. 11¼d. In May, the cost of this diet would have been 51s. 7d.

The nutritional intake from the diets in Table I and II is set out in Table III, per Male Adult Equivalent per day, together with the corresponding requirements as recommended by the Ministry of Health. Both the dietaries provide for approximately the same calorific intake as the 'human needs' dietary for May, as well as for about the same intake of protein, calcium, iron, and vitamin B_1. The diets for November would, however, yield more of the vitamins A and C than the diet for May, which included less fresh vegetables. The 'human needs' diet for November—but not the low cost diet outlined in Table II—would also contain a slightly larger amount of animal protein than the 'human needs' diet for May, owing to the increase in the quantity of meat. To counterbalance that increase, 7 oz. of sausages and 2 oz. of herrings or kippers could have been replaced by about 5 oz. of dried legumes, which would have reduced the total cost of the diet by about 6½d.

TABLE III

Daily Requirements and Intake from 'Human Needs' Diet

	Per Male Adult Equivalent Calories	Protein gm.	Calcium gm.	Iron mgm.	Vitamin A I.U.[1].	Vitamin B_1 mgm.	Vitamin C mgm.
Requirements	3000	70	0.8	10	3000	0.9	30
Intake	3000	83	0.6	13	3900	1.6	52

[1] International Units.

Such a replacement would, however, have been unrealistic from the viewpoint of an ordinary housewife, who is bound to consider primarily the culinary and not the nutritional aspect of her family's daily diet.

Calcium is the only nutrient the intake of which from all the diets in this series would fall short of the amount as recommended by the Ministry of Health; but only by means of a much higher allowance of milk and cheese could it be raised by the required 33 per cent. This is obvious from the figures in Table V, which show that already more than 58 per cent of the total calcium in the 'human needs' diet would be derived from milk and cheese, while a further 20 per cent of it would come from bread and flour. Besides these all the other foods pale into insignificance as sources of calcium.

In previous articles in this series we discussed the possible distribution of the 'human needs' diet within the family, showing how it would be possible to attain a satisfactory nutritional intake in an acceptable form for each member. It seems unnecessary to go again into these details, but we shall consider this particular aspect of the diets from time to time, especially if any substantial changes in the supply of food should make it desirable to investigate whether and, if so, to what extent such changes might affect the nutrition of individuals. Some idea of the relative importance of particular foods for children and adults respectively can be obtained from a comparison of the data in Tables IV and V. In Table IV are set out the requirements of the children and adults in terms of Male Adult Equivalents. Milk clearly stands out as the most important food for children, in particular on account of its high content of calcium. But it is also worth observing the nutritive value of rolled oats—or oatmeal—in the diet of growing children and to note that, weight for weight, the content of iron of this food is higher by about a third than the average content of it of meat. No vitamin values are shown in Table V, but it may be said that it is unlikely that any member of the family would go short of vitamind B_1, however his share in the diet is composed, so long as he regularly partakes in the family meals, since vitamin B_1 is widely distributed among the foods included in the dietary. Of the total content of vitamin A in the diet, about 14½ per cent would be derived from margarine, over 62 per cent from carrots, and about 5 per cent from cabbage—taking 3 International Units of the provitamin carotene as equivalent to 1 International

TABLE IV

Relative Nutritional Requirements

	Calories	Protein	Calcium	Iron	Vitamin A	Vitamin B_1	Vitamin C
Adult Male	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adult Female	0.83	0.86	1.00	1.00	1.00	0.83	1.00
Child, 7—12 years ...	0.70	0.93	1.75	1.30	1.00	1.05	1.00
Child, 5 years	0.50	0.71	1.63	0.80	1.00	0.75	1.00
Family of 5 Persons[1] ...	3.73	4.43	7.13	5.40	5.00	4.68	5.00

[1] 2 children 7—12 years, 1 child 5 years.

TABLE V

' Human Needs ' Diet : Relative Figures of Outlay and Nutritive Values

	Quantity per Week	Outlay %	Calories %	Protein %	Calcium %	Iron %
Meat and Sausages	4 ℔ 11 oz.	15.2	6.3	11.9	0.9	12.9
Bacon	15 oz.	3.9	2.4	1.3	0.1	0.9
Herrings and Kippers	4 ℔ 15 oz.	7.4	3.0	9.1	4.8	4.8
Eggs	5 eggs	3.0	0.5	1.2	0.5	1.3
Cheese	10 oz.	1.5	1.5	2.8	7.3	0.4
All Fresh Milk	20 pints	12.9	8.5	14.0	43.4	2.4
Condensed Milk	3⅓ pints[1]	3.1	2.3	2.6	7.4	0.4
		47.0	24.5	42.9	64.4	23.1
Margarine and Cooking Fat	2 ℔ 13 oz.	5.1	12.7	—	—	0.7
Sugar	2 ℔ 8 oz.	2.1	5.4	—	—	—
Syrup and Jam	1 ℔ 6 oz.	2.5	2.2	0.1	0.4	1.3
Bread	21 ℔ 14 oz.	10.8	31.1	32.7	17.9	35.5
Flour	2 ℔	1.4	4.0	4.1	2.3	4.5
Rolled Oats	2 ℔ 8 oz.	3.0	5.6	5.3	2.0	9.7
Rice and Macaroni	1 ℔ 12 oz.	2.8	3.5	2.1	0.2	0.8
Dried Peas and Beans	1 ℔	1.9	1.6	4.1	1.7	5.2
Prunes	1 ℔	2.1	0.7	0.4	0.5	2.3
Cocoa	4 oz.	1.3	0.6	0.9	0.2	3.3
Potatoes	21 ℔	6.3	6.7	5.2	2.1	6.8
Other Fresh Vegetables	14 ℔	8.0	1.4	2.2	8.3	6.8
Tea and Condiments		5.7	—	—	—	—
		53.0	75.5	57.1	35.6	76.9
Total		100.0	100.0	100.0	100.0	100.0

[1] Approximately.

Unit of the vitamin. In calculating the content of vitamin C of fresh vegetables and potatoes we deducted 50 per cent of the actual values for loss in the preparation and the cooking of the vegetables, since vitamin C is very unstable. Even so, 92 per cent of the vitamin would be derived from these foods and only about 8 per cent from all milk, taking the vitamin C value of a pint of fresh milk as 0.6 mgm. Of the vegetables, cabbage would yield about 42 per cent of the total content of the diet of vitamin C, swedes about 8 per cent, and potatoes about 37 per cent. Since potatoes are also a rather filling calorific food of which children can only eat comparatively small amounts, the importance of fresh vegetables in the diet of children is obvious.

Table V also compares the relative cost of the main foods included in our dietary, those providing first-class proteins being shown first. It will be noted that as compared with the total price of first-class protein in terms of foods, cheese, milk, and herrings and kippers, are ' cheap ' and the remaining ones ' dear ' foods. However, the 20 pints of fresh milk in our dietary include 5 pints received free by the children at school; yet even with these omitted from our calculations, first-class protein in the form of fresh milk still cost slightly less than its average price in the ' human needs ' diet. The much higher calorific value of skimmed condensed milk diluted to fresh milk consistency, than of fresh full cream milk, is due to the content of sugar of condensed milk.

In our survey of '*Human Needs' Diets from* 1936 *to* 1949[1], indices were given showing the changes in the cost of the diets. If we based our index on Mr. Rowntree's actual figure of cost in 1936, a 'human needs' diet approximately equivalent to his was found to require in May 1949, an outlay higher by about 122 per cent. After correcting the figure for 1936 so as to allow for the purchase of 14 pints of fresh full cream milk in lieu of the condensed milk, this increase was reduced to 106 per cent. Table VI shows both the corrected and the uncorrected indices for May and for November 1949, based on the figures for 1936, and it compares them with the index derived from the nearest available figures of changes in the retail cost of food, as published by the Ministry of Labour. Since the Ministry of Labour index was recast, from July 1947, on the basis of the 1937–38 collection of household accounts, no direct comparison is possible with the figures published by the Ministry of Labour before that date; but a rough adjustment to the figures prior to July 1947 gives an index for May–June 1949 of 172 and for September 1949 of 176, as compared with 100 for 1936. Hence while the rise in the cost of the 'human needs' diet from May 1949 to November 1949 only amounted to about ½ per cent, the Ministry of Labour figures indicate a rise in the cost of food of 2½ per cent. This discrepancy between the two indices is mainly due to the fact that the Ministry of Labour index simply measures changes in price of exactly the same quantities of particular foods at all times, while in our dietaries full allowance is made for changes in supply.

TABLE VI. *Indices of Cost*
1936=100

	'Human Needs' Diet		Min. of Labour
	Uncorrected	Corrected	Cost of Food[3]
Spring 1949[1]	222	206	172
Autumn 1949[2]	223	207	176

[1] May for the 'human needs' indices, May–June for the Ministry of Labour index.
[2] November for the 'human needs' indices, September for the Ministry of Labour index.
[3] The way in which the Ministry of Labour figures have been adjusted for inclusion in the Table was discussed in '*Human Needs' Diets from 1936 to 1949*, BULLETIN, Vol. 11, No. 10.

In summing up, the following main points emerge: a 'human needs' diet for a family of 5 persons could be bought in November 1949 at 48s. 11d., which was 3d. more than the cost of a nutritionally and dietetically about equivalent 'human needs' diet 6 months earlier. The meat ration had slightly been raised during this period; changes in other rations approximately cancelled out, from a nutritional view point. The increase in the price of bread and flour required an increased outlay on these two foods of 1s. 1d., while the supply of relatively inexpensive vegetables and of cheaper fish—herrings—entailed a reduction in cost by 3s. 2d. Hence it was the inclusion of these latter foods in the dietary for November which operated in keeping down its total cost, and any deterioration in their supply would be bound to raise it.

T. SCHULZ.

---

[1] BULLETIN, Vol. 11, No. 10.

TRENDS IN COCOA PRODUCTION

British West Africa

Cocoa was first planted in West Africa in 1880 and the earliest recorded shipment was not made until 1891, when 80 lbs. was exported from the Gold Coast. Less than fifty years later, in 1937, exports from the Gold Coast alone totalled 300,000 tons while exports from Nigeria, the Cameroons and the French West African colonies provided over another 150,000 tons : together the Gold Coast and Nigeria produced more than half the world's output in 1937. (See Table I below).

This exceptionally rapid rise in output suggests the presence of specially favourable factors. Certainly, the ecological factors, such as soil and climate, made the establishment of cocoa farms a relatively easy business. In the words of the Nowell Commission Report :[1]

> 'We learned that the early farms, made in ignorance of the appropriate planting methods and conditions, were often far from successful. The results obtained (by the peasant farmers' undivided efforts), however, were favourable enough to attract official attention, and in 1887 there was a Government distribution in the Akwapim district of plants derived from imported San Thomé seed.'

It was also fortunate that the seed first introduced into West Africa was of the yellow Amelonado[2] type, which gives high yields of a cocoa bean showing great uniformity, so that manufacturers could count on a standard quality of produce.

The fortunate accidents of a favourable physical environment and of the chance selection of the most suitable form of cocoa do not alone account for the spectacular success of cocoa as a cash crop in the subsistence economy. Planting was also favoured by economic factors : firstly, the ease with which cocoa could be introduced as an element into the prevailing system of agriculture; and secondly the very much higher productivity per acre under cocoa as compared with other crops. The first has made possible the rapid spread of cocoa planting without the appearance of any fundamental change in agricultural practice[3] and this, coupled with the rapid rise to affluence of those whose farms began to bear, accounts for what has been called this ' miracle of production '[4]

The Agricultural System of the West African High Forest Belt

Before the spread of cocoa planting, peasant farming throughout the high forest area appears to have consisted generally of a system of shifting cultivation. Food crops such as cassava, yam and maize were commonly cultivated, the usual practice being for the farmer to clear a patch in the forest by felling and burning, and to take a crop off this cleared area for two or three years before moving on to clear a fresh patch elsewhere. Land was plentiful and the fallow period before the recultivation of any 'farm' was upwards of 15 years.

---

[1] Report on the Marketing of West African Cocoa, Cmd. 5845, 1938.

[2] Government encouragement came only in 1887 with a distribution of plants from San Thomé seed. By that time, the native peasant farmer had already achieved successful plantation.

[3] In fact, cocoa production tends in the long run to make shifting cultivation impossible.

[4] Cf. *Raw Cocoa Marketing*, W. M. Hood (Cadbury Bros.). Paper read before the International Cocoa Conference, 1946.

When cocoa was introduced, the seeds were planted when the first food crop was being taken from a newly cleared area, and it was found that food crops could continue to be taken off the young cocoa farm for the usual four years, although to a diminishing extent, yields of foods in the fourth year being only a quarter of those in the first.[1] After the fourth crop season the 'cocoa-farm' required no further care for some years, the cocoa seedlings being by then relatively well-grown. Even weeding was unnecessary until the trees began to bear their first crop, usually between the 6th and 10th years, although full bearing took 8—12 years. In the first bearing season, weeds were cleared away with a cutlass between the months of June and August and the first maincrop[2] of cocoa-pods gathered in the last quarter of the year.

Once established in this way, an annual weeding was all the care given to the cocoa farm area before the harvesting of the pods. Instead of the usual fallow cover of 'secondary bush' the soil now carried cocoa-trees, and for the cultivation of food new patches of ground were cleared. Since the only other cash crops of the area were from rubber trees and the oil-palm, both growing scattered through the forest in a wild or semi-wild state, it is not surprising that the planting of cocoa spread with such rapidity, despite the time taken for trees to come into bearing and the time and labour lost through occasional planting on unsuitable soil.

Although productivity per acre varies considerably[3] physical output per acre is considerably higher than in the plantations of the Americas, a fact which has enabled West African cocoa to sell at world prices well below those for the criollo beans of the West Indies and the amelonado of Brazil. Within West Africa, too, cash return per acre has been many times greater from cocoa than from any other crop, even for areas well planted with rubber and palmoil.

The net result of these favourable factors is that cocoa cultivation has spread throughout the high forest belt of West Africa, and although world supply has grown as a whole, that for West Africa has grown faster, its share of the total rising from 54 per cent to 68 per cent in the period between the two wars (see Table I below).

---

[1] Cf. *Akokoaso* : *A Study of a Gold Coast Village*, by W. H. Beckett, L.S.E. Monographs, 1944.

[2] In some areas, a light midcrop is also obtained in June and July, followed by a full maincrop later.

[3] From 400 to 2,500 lbs. (Cocoa Research Conference, London 1946, Report, p. 41, W. H. Beckett), as compared with an average upper range of 500 lbs. in Trinidad.

TABLE I

Raw Cocoa Output

Average		*Total* (*tons*) (000)	*West Africa* (*tons*) (000)	%	*Rest of the world* (*tons*) (000)	%
1919–23	...	421	227	*54*	194	*46*
1924–28	...	497	309	*62*	187	*38*
1929–33	...	541	353	*65*	188	*35*
1934–38	...	667	451	*68*	215	*32*
1939–43	...	593	386	*65*	206	*35*

THE TREND OF COCOA PRODUCTION SINCE 1939

The trend of output since 1939 has been much disturbed by war conditions, more so in West Africa than in other producing countries. West African production had fallen by a third in 1943, to 340 thousand tons, as compared with 511 thousand in 1939. Output in West Africa began to rise again in 1943, but it is widely feared that this rise will not continue owing to the onset of disease and other unfavourable factors.

TABLE II

Raw Cocoa Output

1939–45

Date		*Total* (*tons*) (000)	*West Africa* (*tons*) (000)	%	*Rest of World* (*tons*) (000)	%
1939 ...	...	732	512	*70*	221	*30*
1940 ...	...	612	414	*68*	198	*32*
1941 ...	...	620	417	*67*	204	*33*
1942 ...	...	460	252	*55*	208	*45*
1943 ...	...	537	337	*63*	201	*37*
1944 ...	...	540	339	*67*	181	*33*
1945 ...	...	598	404	*68*	194	*32*

In the Gold Coast, the largest producer in West Africa, annual output of cocoa has declined since the peak year of 1936/37 (see Diagram I).

The broad general trend of output has clearly been upward until the middle of the last decade, after which a decline set in which has not yet been reversed. This decline in output is widely ascribed to the effects of diseases and pests which are known to be attacking West African plantations to an increasing extent. For example Sir Harold Tempany, speaking of the ' swollen shoot ' virus, said ' There is little doubt that this complex, if allowed to pursue its course unchecked, would have resulted in the disappearance of the cocoa industry from West Africa in a measurable space of time '. His remarks were supported by the Gold Coast Director of Agriculture in his statement that ' the Gold Coast cocoa industry had an uninterrupted period of expansion until overtaken by the disease of swollen shoot within the last fifteen years '.

This virus disease of the tree has been estimated to have severely affected over 100,000 acres of mature cocoa in the Gold Coast alone, but this would account for a shortfall of output of at most not more than 25,000 tons, whereas exports had fallen from over 300,000 tons in 1937 to 198,000 tons in 1947. Clearly other factors must have also contributed to the declining trend of the decade, and the question is whether these are to be found amongst the other physical and environmental factors or a group of economic influences whose importance has not so far been recognized.

To what extent is the decline attributable to the changing age-composition of trees, for example, or perhaps to declining yields per acre with the spread of cocoa cultivation to marginal land? Unfortunately, existing records do not provide clear answers to these questions. Long-term agricultural research was one of the first victims of the economy campaigns in the 1930 depression in the colonies, and there is little known with any certainty about this for the Gold Coast cocoa belt. Such records[1] as are available give indications only, although the evidence is inconclusive owing to the small size of the sample, especially in newly planted areas, and to its unrepresentative character. It is clear that a decline in yields sets in when the trees are in their third decade and this conclusion is supported by Nigerian records.[2]

These Gold Coast yield records give no evidence of a decline in yields with the spread of cultivation to new areas; but they do indicate a biennial fluctuation in yields which can be shown to have some correlation with climatic influences such as rainfall. In neither case do they provide a firm basis for analysis, thus leaving unfilled an important gap in the understanding of the industry. Since further investigation may prove this list of environmental factors influencing yields to be incomplete it is to be hoped that the evidence required upon these fundamental questions in cocoa cultivation will not continue to be neglected.

The analysis of the economic factors is limited by this absence of adequate yield data: for the picture is a complex of the two sets of influences. The level of potential output in the year of harvest depends upon the number of bearing trees and their yield in that year. The former is a function of the rates of planting in earlier years, together with mortality rates during the years of growth. Given the population of bearing trees, and the assumption that geographical distribution does not affect yields, the latter depends chiefly upon the climatic influences in the year of harvest. The actual harvest cropped and marketed finally as compared with this potential upper limit may itself be affected by current economic factors, such as harvest prices, in relation to costs of cropping and marketing.

The problem at the economic level is to construct an hypothesis as to the factors determining the two following indices:

1. The rate of replacement of bearing trees (this can be identified with the planting rate for periods in which the mortality rate can be assumed constant);
2. The ratio of the crop actually harvested and marketed each year to the tonnage potentially available.

In economic terms this amounts to the formulation of a long-run and a short-run supply function. Given the assumptions we have made as to factors affecting yields, the simplest hypothesis would be that both long and short-run supply are functions of the 'real' price[1] of cocoa in the corresponding periods.

---

[1] Gold Coast Department of Agriculture: Observation Plot Records. These have been maintained purely for the purpose of crop-forecasting, and hence were not designed to provide the information now wanted.

[2] Nigeria. Department of Agriculture. Cocoa Survey Section Report 1946.

This is the hypothesis it is proposed to test, and the analysis will be restricted at first to the period 1920–1940. For throughout this time the influence of other economic factors appears on general grounds to have been very small. For example, no index need be included in the analysis for the rate of transfer earnings. Other cash crops had ceased to be serious competitors of cocoa by 1920, and their prices did not affect cocoa planting. In later years, cocoa plantings were becoming steadily more continuous, so that investment in any new cash crop was dependent in many areas upon simultaneous disinvestment in cocoa owing to the growing shortage of uncultivated land. Alternative crop prices enter into neither the short nor the long run analysis, therefore.

This is also true of urban occupations, for the peasant farmers of this area traditionally did not engage in urban pursuits in any numbers, except for the small proportion who became traders and craftsmen. The pre-war demand for these was very small and was itself dependent largely upon the prosperity of the cocoa industry, except in mining towns, whose total population was small in relation to the whole. Similarly wage-rates for mining labour had no influence, since the tribes from which such labour is forthcoming are from areas hundreds of miles away, and not those of the cocoa villages closer at hand.

The analysis is made for the Gold Coast only, for which we have sufficient data. It is probable that similar results, which might differ in detail, would be found for other producing areas, notably Nigeria.

The Supply Functions for Cocoa 1920–40

Since actual output is a product of long and short run influences together, a general supply function from which we shall first exclude transfer earnings for the reasons given may be formulated as follows :

$$E_t = f(\pi_{t-a}).g(\pi_t).h(R_t)e^{rt} \qquad \text{(A)}$$

where E_t = actual sales of all cocoa harvested at time t.
π = cocoa prices in real terms, *i.e.* in stable values.[1]
R = index of climatic factors.
a = lag between year of planting and full bearing.

Or taking the long-run and the short-run functions separately, we have respectively :

$$E_t^c = f(\pi_{t-a}) \qquad \text{(B)}$$

where E_t^c = harvests expected upon the basis of prices in the year of planting, *i.e.* at time *a* years earlier.

$$\frac{E_t}{E_t^c} = g(\pi_t).h(R_t).e^{rt} \qquad \text{(C)}$$

where $\frac{E_t}{E_t^c}$ = ratio of actual harvests to harvests expected on the basis of the long-run function : equation B above.

---

[1] That is, the money price of cocoa deflated by the corresponding index of the general price level.

Since all cocoa sold by growers is exported, there being no internal consumption, exports can be taken as an index of sales. For the deflation of cocoa prices a price index of imported consumer goods has been used, on the assumption[1] that these were the yardstick of cocoa values, since the cocoa farmer's food was largely self-produced and land was still very cheap, if not to be had free by tribal custom.

For the purposes of this investigation the following three series have therefore been constructed :

E = *Tonnages of cocoa exports* expressed as a quantity relative (1938=100). Source : Annual Trade Reports of the Gold Coast. Period : calendar year.

P = *Cocoa price index.* No reliable information as to the price received by the farmer is available for the period before 1939. Hence cocoa prices F.O.B. excluding duty were used.[2] Cocoa exports carry a duty which has risen from £1 3s. 4d. per ton to £2 2s. per ton over the period and the aggregate duty was deducted before deriving the unit value of exports. This series was then expressed as a price relative (1938=100).

I = *Import price index.* A price index of the main imports consumed in the cocoa belt was constructed[3] for the period 1921–1947 (1938=100).

In all three cases calendar year figures were used till 1940. The crop year for cocoa runs from October to September but enquiries made by the Gold Coast Department of Agriculture indicated a time-lag of over two months[4] between marketing and export. Since accurate crop-figures were not available for much of the period before 1940 the calendar year figures have been taken as an index of the preceding crop year. From 1940, harvest figures have been used, since these became available owing to the operation of control.

THE TIME-LAG BETWEEN PLANTING AND HARVESTING OF COCOA

The period between planting and first bearing of cocoa, which is an orchard crop, is upwards of seven years under West African conditions. The total impact of new plantings, however, is not reflected in yield figures until the trees are in full bearing. There are no independent yield data for the time-lag between planting and maturity under the prevailing peasant farming conditions, so that the selection of the lag has depended upon the association between prices and total output. For the latter, export tonnages have been used, on the assumption that the variance due to current economic and climatic influences is negligible in relation to the long-run factors affecting plantings.

[1] The use of a ' landed cost ' price-index also involves the assumption that internal retail margins were constant throughout the period. In fact internal retail prices were said to be more flexible than import prices but the divergence between them was not acute before 1939.

[2] The F.O.B. price of cocoa before 1939 was considerably greater than that actually received by the farmer but the two series moved together.

[3] For details see Note on Price-Index of Gold Coast Imports in Rural Consumption, in Appendix.

[4] Sixty-one days for the period 1933–37. Department of Agriculture Bulletin No. S. and S. 29 of 1938. Shippers' stocks are not available for more than a few years of the period covered and so no adjustment for these could be made.

A lag of eight to nine years was suggested by a scatter diagram on a double-log scale of export tonnages against the ‘ real ’ price of cocoa.[1] This was confirmed by correlation of the logarithmic values of exports and ‘ real ’ prices using lags of 10, 9 and 8 years, the highest value of the correlation coefficient being that for the nine-year lag ($r = .83$).

The necessity of using a nine-year lag reduces the number of observations in the series correspondingly. Since the validity of the Import Price Index is questionable for the years affected by the last war, the series available for analysis date from 1921 in the case of prices and, allowing for the time-lag, from 1930 in the case of exports. For the period under review, 1921–1940, the number of observations available is reduced to 11 only, this providing a very slender basis for extensive calculations.

The Long-run Supply Function 1920–40

Adopting the nine-year lag and taking the long-run supply equation as a simple function of the real price (equation B), the equation obtained by taking the least squares on the log. values and transforming again was :

$$E_t = 16.2\ \pi_{(t-9)}^{.36} \qquad \text{(I)}$$

The coefficient of correlation obtained was .83, but in view of the small number of observations and the usual shortcomings of economic time series the regression coefficients should be accepted with caution, despite the low values of the calculated standard error ($\sigma = \pm .05$). The presence of serial correlation in the series used is a major defect, although the recent work of R. Stone[2] suggests this does not make analyses based on such series ‘ consistently misleading either as to the magnitude of the parameters nor as to the reliability of the estimates ’. This conclusion is based upon a method of transformation of the variables to reduce the auto-regressive character of the residuals in the regression equation. On the basis of this work, using the transformation to first differences developed by Cochrane and Orcutt, among others, Stone nevertheless concludes that ‘ estimates based on first differences should be accepted in preference to those based on the original series ’.

Equation B was therefore transformed to first differences, the new series now being free from serial correlation (see Note 2, Appendix). The correlation coefficient of the transformed equation was $r = .69$ and the new coefficent of regression $\beta_{12} = .43 \pm .1$. The formula of the first differences equation is therefore as follows :

$$\frac{E_t}{E_{(t-1)}} = 1.0\left[\frac{\pi_{(t-8)}}{\pi_{(t-9)}}\right]^{.43} \qquad \text{(II)}$$

Since the correlation coefficient of Equation II is still significant[3] at the 5 per cent level and the regression coefficient is of the same order and sign as that in Equation I above, the first differences equation corroborates the general character of the supply function. The standard error of estimate is $\pm$ .04 and the close fit of the export values calculated from this equation (II) can be seen from Diagram I (See Inset).

---

[1] There is no correlation between π_{t-9} and π_t.

[2] Review of the International Statistical Institute 1948, p. 10.

[3] If the 1937 export tonnage is corrected to compensate for the ‘ sellers’ strike ’ which held up sales for four months, the co-efficient of correlation rises to .8 even on the first differences equation. This figure is significant even at the 1 per cent level.

THE SHORT-RUN SUPPLY FUNCTION, 1930–1940

The residual variance to be explained is small in relation to the changes in trend revealed by the long-run analysis above. This bears out our assumption that the short-run elasticity of supply is probably low. Much depends upon the influence of climatic factors, however, since these may mask the responses of the farmers to short-run changes in price. The importance of this variable makes it particularly unfortunate that no suitable index of climate could be constructed from independent yield data, such as the Gold Coast Observation Plots already mentioned. While analysis suggests that high rainfall is a favourable factor but humidity an unfavourable one, there was no conclusive evidence upon which to construct an index from a complex of such factors which tend to be interrelated and auto-correlated.

Since the climatic variable had perforce to be omitted, no valid short-run supply function for this period can be constructed even if the residuals were assumed sufficiently free from random error to justify this. Correlation of the residual export quantities with current prices showed no association ($r = .03$).

The lack of the climatic variable and the very small sample of years available, to say nothing of the problem of error in the residuals,[1] are serious shortcomings which preclude any generalisations. These shortcomings cannot be repaired until the necessary data are forthcoming.

THE TREND OF COCOA OUTPUT 1930–40

From the preceding analysis it appears that changes in the magnitude of cocoa exports from the Gold Coast in the period 1930–40 were to be explained largely by the effect upon planting nine years earlier of changes in cocoa prices. The positive slope of this long-run supply function is indicated in all the methods of formulation.

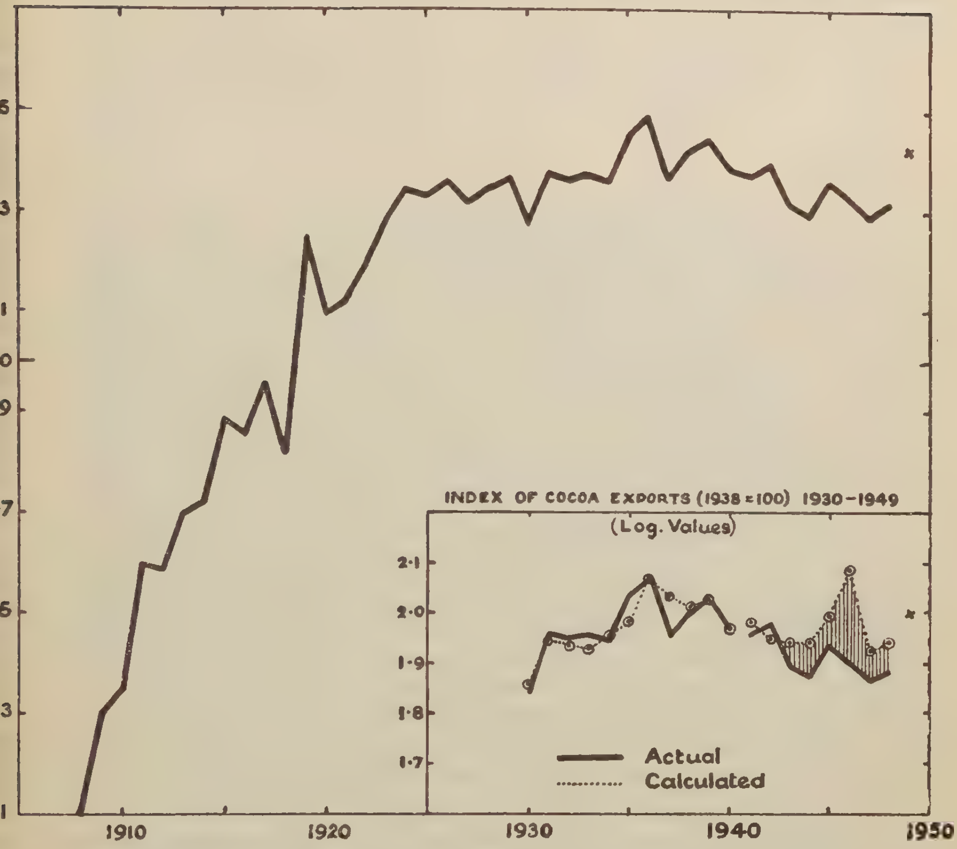
The influence of current factors upon exports is on the contrary very small, so that the short-run elasticity of supply is clearly low. For the short-run supply function the full implications of the analysis are far from certain owing to the deficiencies of the material, but there is no correlation between changes in output and changes in current real prices and the regression coefficient is not significantly different from zero.

Even for the short run, therefore, there is no evidence of the backward sloping supply function so often ascribed to peasant farmers in general. Indeed since cocoa is not consumed locally and transfer earnings were negligible, the usual grounds for postulating a backward sloping supply curve were not present in this period. A negatively sloping supply function could only have been expected on a ' target income ' hypothesis about the African peasant and no evidence of this has been found.

[1] See note 3, Appendix.

DIAGRAM I[1]

GOLD COAST. COCOA EXPORTS 1908–1949 (Log values)



THE TREND OF OUTPUT AFTER 1940

Returning now to the question of the decline in exports after 1937, it is possible to assess the problem in a new light. For the 1930's at least the long-term factors alone sufficed to explain the changes in tonnage marketed and it is of interest to calculate the changes which would be expected in the following decade upon the assumption that this continued to be the case. If we assume that the long-run supply function determining plantings in the 1920's continued to obtain in the 1930's, the harvests[2] which would be expected in the 1940's show a steady decline until 1944 and lie well below the quantity marketed in 1936 which has been the point of reference in all discussions of this problem to date.

It is only from 1943 that the difference between actual and expected values becomes persistently negative and in the five years till 1947 the aggregate difference is about 230,000 tons. The differences for each year of the period are given below, from which it can be seen that the shortfall averaged about 30,000 tons, apart from 1945–46, the expected cocoa-harvest counterpart of the 1936–37 boom.

---

[1] The separate point is a provisional estimate for 1948-9.

[2] From 1940–41 the figures used are annual harvests instead of exports as these became available owing to the introduction of controlled marketing.

TABLE III

Difference between Actual Harvests and Calculated Harvests.

	1942–43	1943–44	1944–45	1945–46	1946–47
Difference in (000) tons	—23	—34	—30	—113	—29

What part of this decline should be attributed to the impact of the 'swollen shoot' disease? Official estimates[1] have put the area heavily affected by 1946 at 'at least 100,000 acres in the Eastern Provinces . . . this main area . . . accounts for 98 per cent of all known outbreaks. This area was one of the first planted and the proportion of bearing cocoa is not known.[2] At most it may account for 15,000–20,000 tons of the deficit in that year. On the other hand another official estimate gave a mortality rate in trees affected by swollen shoot rising from 5 million in 1940 to 15 million in 1945, the loss of cocoa from which would only be about 9,000 tons in the latter year, this giving the lower limit of the shortfall due to the disease.

There is no doubt that the rapid spread of swollen shoot virus and other parasites[3] in the past decade is one of the major factors in the decline of output, but these estimates suggest that it is not alone sufficient to account for the war-time decline. It is significant that the downward spread of actual from expected values begins in 1942–43, the year in which military expenditure in West Africa first reached appreciable proportions. It is arguable therefore that in part the decline may be accounted for by the increasing opportunities of alternative employment offered by the war, *i.e.* by the increasing importance of short-run transfer earnings so far omitted from the analysis.

There were many signs of this in the cocoa belt in the latter part of the war: temporary migration of a proportion of the younger men and women into civilian trades had taken place particularly from the long-established cocoa areas whose yields had begun to fall and in which further expansion of planting was no longer possible; even in the new areas outlying farms were often left untended, temporarily derelict. The scale of the migration (up to 15 per cent of the working population in some areas) was due to the war-time expansion of demand for urban services of the kind customarily supplied by these tribes.

With demobilisation and the end of military spending the return of these migrants is reported to have begun, their interest in cocoa re-awakened by the very high level of post-war cocoa prices, and the reclamation of 'abandoned' farms has been widespread in the last two years. Unlike rubber, the cocoa tree does not benefit from being left unharvested[1] so that the resilience of recent[2] output figures with the price changes that have occurred certainly suggests that the impact of disease, especially 'swollen shoot', has been over-estimated as compared with other more temporary war-time factors.

---

[1] Gold Coast Cocoa Survey, First Interim Report, Sept., 1946, paras. 13 and 14.

[2] Ibid., Appendix II. Of the 140,000 acres surveyed only 56 per cent was between 7 and 30 years old. Twenty-six per cent was over 30 years old. This did not cover the heavily-infected area.

[3] Sahlberghella and distantiella. The decline in output from the Central Province must be attributed partly to these parasites as swollen shoot is hardly known in this area.

CONCLUSION

It would be unwise to extrapolate the long-run supply function of the pre-war decades any further, as the planting rates of the war years may well have been affected by additional factors such as transfer earnings and expectations about the post-war level of cocoa prices. In as much as the assumptions upon which the extrapolation has so far been made continue to hold, the present rise in export tonnage cannot be expected to continue.

The chief value of the analysis given is in emphasising the importance of economic factors in the supply trends of the Gold Coast cocoa-belt at least. It is probable that the general decline in war-time cocoa output from West Africa has similarly been due more to economic influences than to the virus and other diseases that have been given such prominence.

The evidence that these peasant producers show a positive response to price charges both in the long run and,where alternative employment offers, in the short, suggests also that the transition of cocoa-belt societies from a subsistence to a money basis has gone very far towards completion.

P. ADY.

APPENDIX

THE CONSTRUCTION OF AN IMPORT PRICE INDEX OF CONSUMER GOODS GOLD COAST AND NIGERIA 1921–47

For the analysis of peasant farmers' reactions to price changes in these two colonies in recent decades, it has been necessary to construct an index of the changes in prices of imported goods in general consumption, particularly in rural areas. The main sources used have been the annual Trade Reports of each Colony, but the selection of commodities and their weighting has been partly based upon family budget data[3] collected from a selection of rural households in 1945 and 1946.

---

[1] There is a tendency for an infection to spread called 'black-pod disease' if the pods are left on the tree to fall.

[2] Personal estimates of the 1948-9 harvest are about 260,000 tons (see Diagram).

[3] To be published in the Colonial Research Series, H.M.S.O.

SELECTION OF ITEMS

The problem of selection of the commodities for such an index is less difficult than in societies with more complex patterns of consumption. The items constituting a rural budget are relatively few in number and of those which are imported the majority are of simple manufacture or of relatively standardised composition.[1] The problem of substitution arises only in those cases which may involve an undetected change in the size of units (*e.g.* candles, buckets and pails). Any such change would have revealed itself by a sharp discontinuity in the unit values c.i.f. and in the series used no such difficulty has been encountered. (See Diagram II).

The final list excluded certain items commonly bought (such as singlets) for which the data required were not separately available in the early years of the series. It also excluded a few other important commodities such as corrugated iron sheeting, the common form of roofing, partly because of the difficulty of securing a stable unit when quality differences were reflected chiefly in weight and size differences in number, and partly because there has been no way of assessing its due weight owing to the scarcity of this item in the year 1945–46 to which the budget data relate, and to the high proportion of such imports used in commercial and Government building.

Each of the commodities selected is consumed both by the urban and the rural populations of the Gold Coast, the great market for imported goods outside the few towns being the cocoa-belt of the Colony. No reliable pre-war figures are available upon which to base estimates of the relative proportions of each commodity being sold in the cocoa belt as compared with the urban centres, but the division would in any case be partly fictitious owing to the dependence of the two main ports and Kumasi, the railhead, upon the prosperity of the cocoa industry. The only other towns of any size are the mining centres, but their aggregate labouring population was only about 36,000 in 1938, and as their employees are chiefly migrant labourers with a high propensity to save, their influence upon the distribution of consumption within this range of goods has been assumed to be negligible. Finally, the number of non-Africans in the territory was extremely small in 1938, only just over 6,000; these were chiefly Europeans with some Syrians and Indians and their consumption of the items selected is negligible except in the case of cigarettes and tobacco.

For these reasons it has been assumed that the weighting of each commodity within each of the commodity groups constructed could be taken as the aggregate c.i.f. value of the item in 1938. The distribution obtained was compared with budget data and showed considerable similarity. For example, within the group of items listed in Table IV the percentage distribution of annual average expenditure is given separately from the Import Lists for 1938 and 1945 and the budget data of a typical cocoa village in 1945–46.

---

[1] The list of commodities included is as follows, with their weights in parentheses: I, FOOD (175,) [Salt (7), Dried Fish (76), Sugar (92)] ; II, DRINK AND TOBACCO (183), [Cigarettes (103), Tobacco (35), Beer (44)] ; III, Apparel (849), [Piece-goods: grey, white, coloured, print and dyed (809), Yarn (11), Beads (29)] ; IV, Miscellaneous (227), [Soap (32), Candles (24), Matches (23), Paraffin (66), Lamps (11), Gunpowder (7), Buckets (14)].

DIAGRAM II. IMPORT PRICE INDEX: GOLD COAST (1938=100) (INCLUDING DUTY)

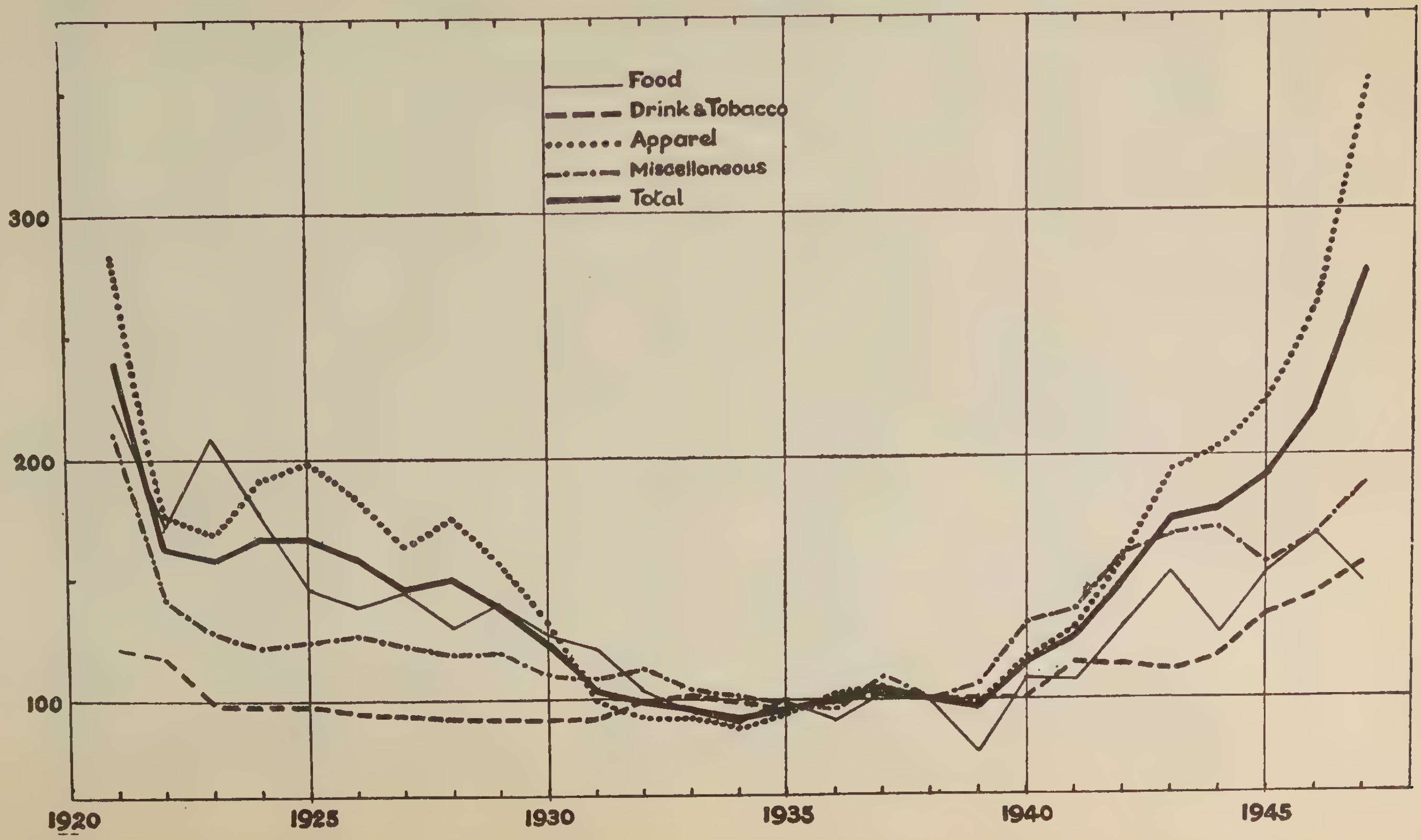


TABLE IV

Percentage distribution of selected items : Import values and rural budget data.

	Paraffin	Candles	Matches	Soap	Household utensils	Tobacco	Cigarettes	Cloth	Total for list
1945 Imports ...	2.0	1.1	0.7	2.8	3.4	5.1	10.4	74.6	100
1938 Imports ...	4.9	1.8	1.7	6.1	1.9	5.3	15.4	63.0	100
1945–46 Budgets	8.2	0.6	2.4	9.0	2.6	3.3	5.5	68.3	100
1938 Impts. adjd.[1]	5.4	2.0	1.9	6.8	2.1	3.0	8.6	70.2	100

[1] Weight given to tobacco and cigarettes reduced by half.

It is unfortunate that no information is available for pre-war years as to the pattern of African consumer expenditure, either rural or urban. The chief differences are in tobacco and cigarettes on the one hand, both occupying a higher proportion in the import list than in the farmers' budget, and cloth, paraffin and soap of which the reverse is true. While the complete dearth of information makes any fine adjustment of the weights impossible, some improvement is secured by underweighting the tobacco and cigarettes group, as the adjusted 1938 Import List percentages show in Table IV. These were obtained by taking 50 per cent of the c.i.f. value for tobacco and cigarettes, leaving all other weights unchanged. These adjusted percentages were used in the final index.

The series of import price indices were constructed for each territory separately, the one based on unit values at port of entry (*i.e.* before payment of duty), the other upon these unit values *plus* the corresponding import duty upon each item. Only the series including duty have been printed here (see Table V).

TABLE V

Indices of Import Prices (including duty) (1938=100)

	1921	'23	'26	'29	'32	'34	'37	'39	'42	'45	'47
Gold Coast ...	240	159	159	139	98	92	105	97	149	192	276
Nigeria ...	215	147	143	130	92	90	100	101	177	243	342

The indices are weighted aggregates of the Laspeyre type whose formula is

$$\frac{\Sigma p_0 q_0 \cdot p_1/p_0}{\Sigma p_0 q_0}$$

An index of this type has an inherent downward weighting bias, so that the upper values of the range obtained (248 in 1921 and 284 in 1947) should, if anything, be regarded as understatements. This system of weighting has been adopted in preference to chain index of the Paasche type with a current year weighting for two reasons : firstly that in the earlier years of the series, especially 1920–24, the required information would have been difficult to secure in any detail; and secondly that it is less certain for the early years whether the distribution of African expenditure is adequately reflected in that of aggregate import values. In the circumstances it has been judged better to use 1938 weights throughout since the downward bias imparted to the indices in the 1920's would offset rather than reinforce errors arising from the changing composition of consumption.

2. Test for Serial Correlation

Following Stone, the original series, used in Equation I, was tested by von Neumann's ratio

$$\frac{\delta^2}{s^2} = \frac{N}{N-1} \cdot \frac{\Sigma_{t=2}^{N}(x_{1t}-x_{1(t-1)})^2}{\Sigma_{t=1}^{N}(x_{1t}-\bar{x}_1)^2} = \nu$$

which for a random series is symmetrically distributed about the mean of

$$\Sigma(\nu) = \frac{2N}{(N-1)}$$

with a variance of

$$V(\nu) = \frac{4N^2(N-2)}{(N-1)^3(N+1)}.$$

This test itself is not sufficiently sensitive for very small numbers of observations but the presence of serial correlation in the dependent variable was demonstrated by a value of $\nu = 1.36$ instead of $2.22 \pm .68$. After the transformation to first differences, however, the value of von Neumann's ratio became 2.24 as compared with $2.25 \pm .67$.

3. Errors in the Residuals

The short-run function is based on an analysis of the residuals from the long-run equation (equation II, p. 395). Two types of error may vitiate the analysis : firstly errors arising in the original series and secondly those arising from the persistence of serial correlation in the residuals.

One error of the first type would certainly arise in so far as the index used in deflating the money prices of cocoa was an insufficient measure of its exchange value to the farmer. In our case the index constructed has such shortcomings, since for reasons of statistical convenience it does not cover all the imported goods which the farmer purchases and secondly does not cover food purchases. On general grounds it was thought that both these categories are extremely limited in importance, especially the latter since the bulk of the farmers' diet is self-grown. In order to test this hypothesis further, however, the correlation of exports with prices was repeated using the two series as separate variables. Using the first differences transformation, the multiple correlation coefficient obtained was .75 as compared with .69 in the simple correlation of Equation II and the equation obtained was

$$\frac{E_t}{E_{(t-1)}} = .98 \left[\frac{P_{(t-8)}}{P_{(t-9)}}\right]^{.33} \left[\frac{I_{(t-8)}}{I_{(t-9)}}\right]^{-.70}$$

Whereas in the simple correlation it had been assumed from the form of the equation that the sign of P and I were equal and opposite, it can be seen that this does not obtain. However the difference is within the standard error of the two coefficients since these are

$$\sigma b_P = \pm .2 \qquad \sigma b_I = \pm .3.$$

The difference between the logarithmic values of actual and calculated exports for the period 1930–40 was then tested[1] for serial correlation, but these residuals gave a von Neumann ratio of 2.34 as compared with the expected 2.22 ± .62. As these values are residuals from the regression plane von Neumann's test is less applicable here, quite apart from the question of size of sample, but it does provide a sufficient indication, the small sample not justifying the use of more accurate tests such as that devised by Moran[1] specifically for residuals.

---

[1] P. A. P. Moran, to be published in Biometrika.

TABULAR APPENDIX

TABLE I. UNITED STATES

Index Nos. 1935–39=100[1]	Monthly Averages 1941	1945	1946	1947	1948	1949 March	April	May	June	July
Personal Incomes, bill. $[2] … …	95.3	171.6	178.1	195.2	213.6	212.4	212.5	213.1[8]	212.4[8]	(209.7)
Consumption expenditures, bill. $[3] …	82.3	121.7	143.7	164.4	177.7	177.9	…	…	178.2	…
Dept. Store Sales—										
Value Index[4] … … …	133	207	264	286	302	277	294[8]	292	285[8]	280
Vol. Index of Farm Marketings[5] …	116	140	139	147	143	120	114	123	132[8]	141
Employment,[6] millions … …	36.2	40.0	40.7	42.5	45.1	43.9	43.9	43.7	43.7	(43.5)
Unemployment, millions … …	5.0	1.1	2.3	2.1	2.1	3.2	3.0	3.3	3.8	4.1
Building Contr. Awarded—										
Value Index … … …	213	119	266	276	331	304	324	314	338	355
Vol. Index[7]… … … …	183	86	168	149	159	143	152	147	158	165
Ind. Production Index[2]—										
Durable … … … …	201	274	192	220	225	223	212	201	194	(185)
Non-durable … … …	142	166	165	172	177	168	162	161	160	(156)
Minerals … … … …	125	137	134	149	155	136	148	145	134	(124)
Manuf. Orders—Index[9] (1939=100)	203	189	211	247	252	215	195	203	208[8]	192
Manuf. Inventories[9]—										
Index (1939=100) … …	158	167	218	261	279	296	291	288	282[8]	276
Wholesale Price Index— …										
Farm Products … … …	108	169	198	239	247	226	225	226	222	218
Foods … … … …	105	134	165	213	227	206	206	207	206	204
All others … … …	110	123	135	166	186	186	184	181	180	179
Cost of Living Index … …	105	128	139	159	171	170	170	169	170	169
Factory Av. Hourly Earngs., cts. …	73	102	108	122	133	137	137	137	138	138
Imports. Total Mill. $ … …	279	344	409	478	589	632	534	540	526	456
from Europe, Mill. $ … …	24	…	66	68	91	91	67	67	69	…
Exports, Total Mill. $ … …	427	817	812	1278	1051	1159	1148	1078	1104	897
to Europe, Mill. $ … …	128	…	342	440	357	412	401	392	392	…

Sources : *Bureau of the Census* for Unemployment ; *U.S. Department of Commerce* for Income Payments, Consumer Expenditures, Farm Marketings, Manufacturers' Orders and Inventories, and Foreign Trade ; *U.S. Department of Labor* for Employment, Prices and Wages ; *Federal Reserve Board* for Department Store Sales, Building Contracts and Industrial Production.

[1] All index numbers, except those of prices and manufacturers' orders, inventories and farm marketings, are adjusted for seasonal variations.

[2] Seasonally adjusted at annual rates.

[3] Quarterly figures, seasonally adjusted at annual rates.

[4] Average per working day.

[5] The monthly figures are no longer seasonally adjusted.

[6] All employees in non-agricultural establishments, unadjusted figure.

[7] Value Index deflated with the (Engineering News Record) Index of Construction.

[8] Revised figure.

[9] Value Index.

TABLE II. UNITED KINGDOM[1]

	Unit	Monthly Averages 1938	1945	1946	1947	1948	1949 May	June	July	Aug.	Sept.
Production of—							4.2	4.1[2]	3.6	3.6	4.2[2]
*Coal (weekly av.) ...	Mill. tons	4.4	3.5	3.6	3.8	4.0	316	301[2]	244	288[2]	306
Steel (weekly av.) ...	000 tons	200	227	244	240	286	738	739	915[9]	716	715
Cement	000 tons	643	338	548	580	710	451	444	416	452	481
*Bricks	Millions	650	102	287	378	383	31.6	40.4	25.5	30.3	43.6
Passenger Cars	Thousands	28.4	1.4	18.3	23.9	27.4	17.5	19.9	12.6	15.9	22.5
Comm. Vehicles ...	,,	8.7	10.2	12.2	12.9	14.2	1.96	1.93	1.87	1.92	1.95
Merchant Vessels[3] ...	Mill. gr. tons	0.78	1.49	1.77	1.98	1.98	16.85	14.45[2]	15.48	14.87	...
Cotton Yarn[10] (wkly. av.)	Mill. lb.	23.7[11]	11.48	12.73	12.73	15.24	14.74	13.67	14.40	12.91	...
Rayon[12]	,,	8.52	7.09	8.97	9.90	12.34	3.85	3.39	3.26	3.45	3.67
Electricity	000 mill. kwh	2.0	3.1	3.4	3.5	3.9	45.3	41.5	38.8	39.2	41.8
Gas (weekly av.)[14] ...	Mill. therms	31.9	38.9	43.1	44.4	46.2	15.33	15.15	13.74	13.49	15.96
*Perm. Houses[4] ...	Thousands	30.0	0.22	4.12	10.53	16.6	22.1	22.2	22.2	22.2	...
*Employment total[5] ...	Millions	...	...	...	...	...	8.3	8.2	8.2	8.3	...
*Manuf. Ind.	,,	...	...	...	...	...	304	264	243	261	268
*Unemployment[6] ...	Thousands	1688	103	359	256	282	197	191	191	177	...
*Retail sales (weekly) ...	1938=100	100	116	137	155	176					
Wholesale Prices—							204	207	207	207	205
Food and Tobacco ...	,,	100	163	163	169	186	241	240	236[15]	236	238
Ind. Prod.	,,	100	169	178	200	234	...	...	...	...	...
Consumer Goods' Prices[7]	,,	100	153	157	168	...	111	111	111	111	112
Retail Prices	June 1947=100	...	...	...	100[13]	108	180	181	181	181	181
Weekly Wage Rates ...	Sept. 1939=100	...	150	162	168	176	195	202	186	200	181
Retained Imports ...	£ Mill.	77	92	108	149	173	151	143	142	137	142
U.K. Exports	,,	39	33	76	95	132					
Terms of Trade[8] Annual	1938=100	100	95	93	86	85	...	...	...	...	...
Monthly	1947=100	...	...	...	100	...	97	98	100	102	...

Sources: Monthly Digest of Statistics; Ministry of Labour Gazette; Board of Trade Journal.

[1] Figures for items marked * refer to Great Britain.

[2] Average of five weeks.

[3] Tonnage under construction at end of period, 100 gross tons and over.

[4] New permanent houses completed by local authorities and private builders; excluding aluminium houses.

[5] New series. Total number of persons aged 15 and over who work for pay or gain (including domestic servants). Part-time workers are counted as full units.

[6] Number of insured workers registered as wholly unemployed or temporarily stopped. From July 1948 onwards, all unemployed persons on the registers of Employment Exchanges. Mid-yearly (mid-July), or mid-monthly figures.

[7] Prices of consumer goods and services calculated from the annual White Papers on National Income and Expenditure.

[8] Ratios of indices of export prices to indices of import prices. Annual indices are ratios of 'Average Value' indices. Monthly indices are ratios of 'Price Indices'. The former series is preferred for long range, the latter for short range, comparisons. Different construction of indices prevents linking.

[9] Five week period (or 4½ week period).

[10] Excluding staple fibre, mixed and waste yarns.

[11] 1937.

[12] Excluding staple fibre.

[13] June 17th.

[14] Total available at gas works.

[15] Revised figure.

TABLE III. FRANCE

	Unit	Monthly Averages 1938	1945	1946	1947	1948	1949 Mar.	April	May	June	July	Aug.
Production of—												
Coal[1]	Mill. m. tons	4.0	2.8	4.1	3.9	4.7	4.7	4.4	4.3	4.1	3.8	(4.1)
Electricity	000 Mill. kwh.	1.5	1.5	1.8	2.1	2.3	2.3	2.2	2.8	2.3	2.3	...
Steel	Mill m. tons	518	136	367	478	604	826	750	811	767	742	...
Cement	000 m. tons	296	127	281	321	448	556	550	581[4]	575	538	...
Comm. Vehicles ...	Thousands	3.7	2.7	5.2	5.9	7.9	9.3	8.9	9.2	8.8	8.1	...
Passenger Cars ...	,,	15.2	0.1	2.5	5.5	7.4	15.2	15.1	16.9	16.2	16.3	...
Cotton Fabrics ...	000 m. tons	12.1	2.7	8.4	11.2	12.6	14.1	13.3	13.9	14.0	...	...
Wagon ldgs. (dly.)	Thousands	41	17	31	35	38	34.9	32.9	32.8	32.1	31.0	29.4
Unemployment[2] ...	,,	373.6	15.8	15.7	7.4	16.7	33.4	35.1[2]	39.2[2]	39.8	40.8	41.1
Wholesale Prices ...	1938=100	100	373	648	989	1712	1872	1846	1890	1812	1854	1910
Retail Prices[3]	,,	100	393	645	1030	1632	1781	1757	1738	1726	1715	1752
Imports	000 m. frs.	3.8	4.8	19.5	28.9	54.5	77.3	85.4	81.3	71.6	67.5	...
Exports...	,,	2.5	1.0	8.5	17.7	35.9	63.3	69.1	65.9	64.2	60.8	...

Source : Bulletin de la Statistique Générale de la France.

[1] Including lignite.

[2] Unemployed on relief ; monthly figures refer to mid-month, but for April and May refer to 1st of month.

[3] Retail prices in Paris of 34 articles. [4] Revised figure.

TABLE IV. BELGIUM

	Unit	Monthly Averages 1939	1945	1946	1947	1948	1949 Mar.	April	May	June	July	Aug.
Production												
Total Industry	1936–38=100	95	...	...	96	103	111	107	...	...	...	...
Coal	Mill. m. tons	2.5	1.3	1.9	2.0	2.22	2.62	2.43	2.40	2.35	1.86	2.00
Steel	000 m. tons	252	61	190	241	326	416	356	339	322	279	...
Cement ...	,,	213	54	157	217	278	224	253	256[3]	245	(245)	(254)
Electricity	Mill. kwh	466	377	520	601	659	738	669	670	632	591	628
Textile Ind.	1938=100	113	38	92	110	104	131[3]	129	...	...	...	...
Paper Ind.	,,	120	26	109	132	135	131[3]	133	...	...	...	...
Unemployment[1]	Thousands	195	145	67	68	130	237	220	213	215	...	...
Retail Prices	1936–38=100	106	329	334	343	393	382	380	379	381	379	378
Imports[2] ...	000 mill. frs.	1.7	1.1	4.4	7.1	7.3	7.1[3]	6.7	6.9	6.7	6.2	6.5
Exports[2] ...	,,	1.8	0.3	2.5	5.1	6.2	7.6	7.0	7.2	7.3	7.1	6.1

Source : Institut National de Statistique ; Banque Nationale de Belgique. Bulletin de Recherches Économiques et Sociales.

[1] Daily average of registered unemployed. [2] Including Luxemburg. [3] Revised figure.

TABLE V. NETHERLANDS

	Unit	Monthly Averages 1939	1945	1946	1947	1948	1949 Mar.	April	May	June	July
Production—											
Coal	000 m. tons	1072	424	693	842	919	1026	934	961	944	982
Electricity	Mill. kwh	223	98	225	283	344	401	354	361	331	327
Bricks	Millions	84.1	7.6	45.3	60.0	81.0	90.4	75.4	77.9	81.9	85.4
Cement	000 m. tons	45.1	21.2	33.6	43.3	49.1	45.6	48.4	50.8	46.2	54.6
Butter	000 m. tons	9.0	3.2	4.4	4.4	5.9	4.9	7.2	10.4	10.1	9.6
Cheese	000 m. tons	10.1	3.1	5.4	5.4	8.1	8.1	10.8	13.5	...	...
Unemployed[1] ...	Thousands	235.6	...	53.1	30.7	29.0	39.0	36.9[5]	35.1	31.8	33.2
Retail trade[2] ...	1938=100	105	...	181	242	283	283	322	291	278	301
Cost of living ...	1937=100	102	(176)	(192)	199	205	217	218	221	...	...
Wage rates in Industry[3]	1937=100	104	135	168	173	182	187	187	188	188	...
Imports[4]	Mill. fl.	130	...	197	357	414	479	440	431	444	414
Exports[4]	,,	84	...	68	158	226	287	258	277	316	288

Source : Centraal Bureau voor de Statistiek ; Rotterdamsche Bankvereeniging ; United Nations, Monthly Bulletin.

[1] Registered wholly unemployed excluding public relief workers.

[2] Value of turnover. [3] Hourly rates for men in manufacturing, mining and construction.

[4] Excluding silver bullion and specie. [5] Revised figure.

TABLE VI. DENMARK

Index Nos. 1938=100	Unit	Monthly Averages 1939	1945	1946	1947	1948	1949 May	June	July	Aug.	Sept.
Production											
Industrial[1] ...	Index	105	74	101	116	129	135	136	106	139	150
Animal prod.	,,	101	68	76	75	68	92	94	94	88	95
Butter	000 m. tons	15.2	11.0	11.7	10.4	10.1	16.2	16.6	15.6	14.7	13.7
Meat (pork)	,,	27.4	15.1	16.3	16.9	14.3	19.3	21.6[4]	21.6	23.7	26.7
Electricity[2] ...	Mill. kwh	69[3]	76	98	115	145	131	123	117	139	146
Wholesale prices ...	Index	105	190	188	207	227	233	232	228	228	230
Cost of living ...	,,	101	159	158	163	166	...	...	167	...	...
Imports	Mill. kr.	145	58	237	258	285	398	354	304	344	283
Exports	,,	132	75	135	193	288	305	289	237	304	306

Source : Danmarks Statistik, Statistiske Efterretninger ; United Nations Monthly Bulletin.

[1] Revised Series. [2] Consumption. [3] 1938. [4] Revised figure.

TABLE VII. NORWAY

Index Nos. 1938=100	Unit	Monthly Averages 1939	1945	1946	1947	1948	1949 April	May	June	July	Aug.
Ind. Prod.... ...	Index	107	69	100	115	125	136	141	137	89	121
Electricity gen. ...	Mill. kwh	851	820	938	938	1037	1250	1243	1104	1027	...
Retail turnover	Value Ind.	105	120	182	223	223	238	...	...	...	...
Wholesale prices ...	Index	102	177	169	175	181	183	183	183	188	187
Cost of living ...	Index	102	156	159	160	159	158	159	159	159	164
Imports	Mill. kr.	114	100	183	318	309	290	436	358	291	...
Exports	,,	67	27	100	152	172	208	168	174	165	...

Source : Central Bureau of Statistics ; Bank of Norway.

TABLE VIII. SWEDEN

Index Nos. 1939=100	Unit	Monthly Averages 1939	1945	1946	1947	1948	1949 April	May	June	July	Aug.
Ind. Production[1] ...	Index	109	113	136	139	143	147	146	145	...	...
Unemployment[2]	Per cent	9.2	4.5	3.2	2.8	2.8	2.8	1.9	2.0	1.7	...
Steel Production	000 m. tons	99	100	101	99	105	...	...	111[4]	...	...
Cost of living ...	Index[3]	104	145	146	150	157	...	...	160[4]	...	...
Imports	Mill. kr.	208	90	282	435	404	325	360	334	320	344
Exports	,,	157	146	212	270	330	309	362	371	331	330

Source : Index, Svenska Handelsbanken ; Quarterly Review, Skandinaviska Banken ; United Nations Monthly Bulletin.

[1] Revised series.

[2] Unemployment in Trade Unions (percentage).

[3] 1937=100.

[4] Refers to quarter.

TABLE IX. SWITZERLAND

Index Nos. 1938=100	Unit	Monthly Averages 1938	1945	1946	1947	1948	1949 April	May	June	July	Aug.	Sept.
Employment—												
All Industries	Quart. Index	100	110	123	134	136	...	...	128[5]	...	...	
Building	„	100	89	108	119	123	...	...	127[5]	...	...	...
Metal Ind.	„	100	122	137	147	152	...	...	143[5]	...	...	...
Chemical Ind.	„	100	130	157	174	178	...	...	168[5]	...	...	...
Cotton	„	100	76	87	97	101	...	...	93[5]	...	...	...
Food Ind.	„	100	106	120	129	133	...	...	126[5]	...	...	...
Electricity gen.[1]	Mill. kwh	448	665	696	650	728	648	769	783	...	...	...
Building permits:												
New Flats...	Numbers	703	752	1043	1261	848	1270	887	2133	...	...	...
Factories[2]	„	93	167	267	281	217	...	...	447	...	...	...
Tourism[3]	Thousands	630	264	506	703	667	463	564	808	...	...	...
Cost of living[4]	Index	100	152	152	158	163	161	161	162	161	161	162
Imports	Mill. frs.	134	102	285	402	417	306	304	303	278	278	286
Exports	„	110	123	223	272	286	270	269	288	290	258	311

Source: Schweiz. Nationalbank; Departement Fédéral de l'Economie Publique.

[1] Public power stations.

[2] Including extensions and structural changes.

[3] Number of nights spent by foreign tourists in Swiss hotels and sanatoria (000).

[4] August 1939=100.

[5] Monthly average for the quarter ending with the month mentioned.

TABLE X. ITALY

	Unit	Monthly Averages 1939	1945	1946	1947	1948	1949 Mar.	April	May	June	July
Electricity Prod.	000 m. kwh	1.3	0.9	1.3	1.5	1.7	1.3	1.2	1.6	1.7	1.7
Steel Prod.	000 m. tons	190	23	96	142	177	146	146	202	203	188
Coal Imports	000 m. tons	1100[1]	...	476	757	656	858	700	1471	1502	1092
Unemployment	Millions	...	...	1.7	2.0	(1.7)[2]	1.8	1.7	1.7	1.5	1.5
Cost of living	1938=100	...	...	2823	4575	4844	4980	5052	5047	4990	4827
Imports[3]	000 m. lire	0.9	...	7.6	77.6	68.5	87.7	80.3	88.0	77.2	...
Exports[3]	„	0.9	...	5.4	28.3	47.6	55.8[4]	48.6[4]	52.6	52.8	...

Source: Instituto Centrale di Statistica; United Nations Monthly Bulletin of Statistics.

[1] Average 1935, 1937 and 1938.

[2] Average October–December.

[3] Excluding silver specie.

[4] Revised figure.

TABLE XI. FINLAND

Index Nos. 1939=100	Unit	Monthly Averages 1939	1945	1946	1947	1948	1949 April	May	June	July	Aug.
Production—											
Home Ind.[2] ...	Index	100	100	119	132	156	...	...	...	...	...
Export Ind.[2] ...	,,	100	...	...	...	...	...	...	...	...	...
Electricity ...	Mill kwh	259	247	244	239	232	282	308	267	244	280
Wholesale Prices	Index	100	366	573	690	911	896	884	885	922	931
Cost of living ...	1938–39[1]=100	101	278	445	584	786	...	...	782	...	...
Imports	Mill. Mark	631	568	2023	3914	5537	4604	5319	4590	5783	4803
Comm. Exports ...	,,	643	436	1921	3769	4709	4015	4079	4667	6068	5502
Reparation Deliv.	,,	...	685	731	867	962	...	...	...	...	...

Source: Unitas, Quarterly Review of Trade Conditions in Finland; Monthly Bulletin, Bank of Finland. United Nations Bulletin of Statistics.

[1] August 1938 July 1939.

[2] Official annual index 1939–46; Unitas monthly index 1946–47; Kansallis-Osake-Pankki quarterly index 1948 onwards.

TABLE XII. POLAND

	Unit	Monthly Averages 1938[1]	1945	1946	1947	1948	1949 Mar.	April	May	June	July
Production—											
Coal	Mill. m. tons	3.2	2.3	3.9	4.9	5.9	6.4	5.9	6.2	5.7	6.0
Cement	000 m. tons	143	33	117	127	152	194	177	230	...	...
Glass	,,	2.1	...	...	5.0	6.3	7.5	5.6	6.2	...	...
Paper	,,	17.1	3.4	12.4	17.2	20.6	23.9	21.6	21.0	...	...
Electricity	Mill kwh	319	418	476	551	626	693	610	623	...	...
Cost of living[2]	Index[2]	...	...	...	100	104	109	111	112	112	...

Source: Central Statistical Office of the Republic of Poland.

[1] Pre-war frontiers.

[2] Retail prices of goods and services purchased by a wage-earner's family in Warsaw city (prices of rationed articles are not included). 1947=100.

TABLE XIV. GERMANY (BIZONAL AREA)

	Unit	Monthly Averages				1949				
		1936	1946	1947	1948	Feb.	Mar.	April	May	June
Ind. Prod.	1936=100	100	33	40	60	80	90	82	88	85
Machinery and optical goods ...	,,	100	...	34	52	82	94	85	89	87
Vehicles	,,	100	...	15	39	72	85	79	86	92
Elec. Equipment ...	,,	100	...	59	105	174	187	169	173	169
Text. & Clothing ...	,,	100	...	30	52	76	93	85	93	86
Chemicals	,,	100	...	40	61	77	90	81	86	88
Production of—										
Hard Coal	Mill. tons	9.7	4.5	5.9	7.3	7.9	8.9	7.9	8.4	8.1
Steel Ingots ...	000 tons	1187	207	246	448	662	752	705	771	750
Cement	,,	626	194	225	426	419	546	583	669	659
Potash	,,	44.0	23.7	26.8	42.5	52.0	59.1	50.9	56.8	58.3
Cotton Yarn ...	,,	19.5	3.3	5.5	8.5	12.8	15.8	14.3	16.4	14.5
Electricity gen.[1] ...	000 kwh	948	(1218)	1262	1483	1655	1794	1597	1657	1535
Import arrivals[2] ...	Mill. $	...	54	61	117	113	148	155	(144)	(162)
Export deliveries[2] ...	,,	...	12	19	50	88	86	100	(96)	(104)

Source : Monthly Statistical Bulletin of the Control Commission for Germany (British Element).

[1] Generation by Public Utility Stations. [2] From preliminary survey.

TABLE XV. AUSTRIA

	Unit	Monthly Averages				1949					
		1937	1946	1947	1948	March	April	May	June	July	Aug.
Ind. Production—											
Prod. Goods	1937=100	100	...	84	129	146	153	171	169	174	...
Cons. Goods	,,	100	...	42	65	85	85	90	94	92	...
Production of—											
Hard Coal ...	000 m. tons	19.2	9.0	14.8	14.8	16.0	15.5	15.3	15.1	14.1	14.6
Lignite ...	,,	270	200	236	278	339	306	298	285	321	310
Pig Iron ...	,,	32.4	4.8	23.2	51.1	77.6	69.0	79.0	74.2	77.3	75.9
Steel	,,	54.1	15.6	29.7	54.0	71.9	64.3	69.4	56.9	74.6	69.1
Cement ...	,,	35.8	32.6	25.2	60.1	80.2	86.9	100.5	98.8	111.8	...
Electricity gen. ...	Mill. kwh	152	242	270	351	290	343	388	402	409	388
Cost of living[1] ...	Mar. '38=100	...	107	211	321	365	363	363	432	432	428
Imports	Mill. Schill.	121.1	20.9	99.4	216.9	364.9	338.7	341.0	392.4	363.0	...
Exports	,,	101.4	18.3	70.2	165.3	286.8	258.3	291.3	288.9	255.6	...

Source : Monatsberichte des Oest. Institutes für Wirtschaftsforschung.

[1] In Vienna. Revised index of the Institut für Wirtschaftsforschung : 1 old Schilling (S 1937)=1 new Schilling (S 1948).

DATE DUE

GAYLORD

PRINTED IN U.S.A.